$P(X = \text{compustown}) = b$

$= P(X = \text{comp}, R = 1) + P(X = \text{comp}, R = 0)$

$b = ap + (1-a)\frac{1}{m}$

$$p = \frac{b - (1-a)/m}{a}$$

9 OPTIMIZATION

$w = [w_0, \ldots, w_{m-1}]$ $\qquad w_i \in \{0, \ldots, n-1\}$

1a Exhaustive search

m coefficients, each has n values

$\Rightarrow$ n^m possible w vectors

$\Rightarrow$ $O\{n^m\}$

1b Coordinate search w/ random restarts

For each restart:

generate a random starting w

for each iteration:

for each coordinate $0 \le i \le m-1$:

- find best possible value, $\hat{w}_i$, of w_i, under condition that w_j fixed. Record $\mathcal{L}_i = \mathcal{L}([w_0, \ldots, w_{i-1}, \hat{w}_i, w_{i+1}, \ldots, w_{m-1}])$

Find $i^* = \arg\min \mathcal{L}_i$

$w \leftarrow [w_0, \ldots, w_{i^*-1}, \hat{w}_{i^*}, w_{i^*+1}, \ldots, w_{m-1}]$

Restarts: p

Iterations: q

Coordinates: m

Values: n

Total complexity: $pqmn$ $\qquad O\{pqmn\}$

Question: How large does p have to be to make

$O\{pqmn\} = O\{n^m\}$

$$\boxed{p = \frac{n^m}{qmn} = \frac{n^{m-1}}{qm}}$$